

1.1 Representing Linear Relations

p.8-13

- to represent and solve linear relations using equations, table of values and graphs.

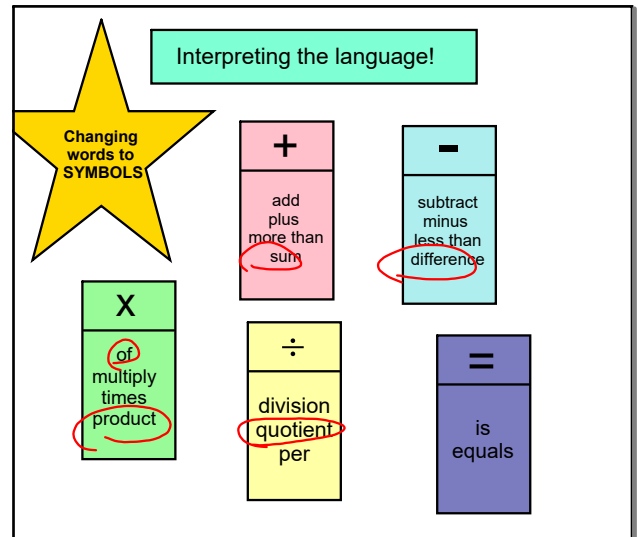


Recall: A relation is a statement that describes how two variables are related to each other.
For a **linear relation**, the two variables relate so that their graph is a straight line.

To represent a linear relation you can use:

- a table of values
- a graph
- an equation ★ this will be our focus

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Writing Equations

★ clearly define variables used, including units

★ use descriptive variables where possible

Verbal Define Variables Equation

- the difference between two #'s is 50
- an amount of money invested at 6% earned \$50
- 7 medium pizzas and 2 large cost \$90
- a piggy bank has a total of 42 nickels and dimes
- some dimes and quarters have a value of \$5.15
- Jane's earnings are based on 5% commission plus \$200 base salary

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Writing Equations

★ clearly define variables used, including units

★ use descriptive variables where possible

Verbal Define Variables Equation

- the difference between two #'s is 50
 $x = \text{larger \#}$
 $y = \text{smaller \#}$
 $x - y = 50$
 $x > y$
- an amount of money invested at 6% earned \$50
 $x = \text{amount invested}$
 $0.06x = 50$
- 7 medium pizzas and 2 large cost \$90
 $x = \text{cost of med pizzas (\$)}$
 $y = \text{cost of large pizzas (\$)}$
 $7x + 2y = 90$
- a piggy bank has a total of 42 nickels and dimes
 $n = \text{\# of nickels}$
 $d = \text{\# of dimes}$
 $n + d = 42$
- some dimes and quarters have a value of \$5.15
 $d = \text{\# of dimes}$
 $q = \text{\# of quarters}$
 $0.10d + 0.25q = 5.15$
- Jane's earnings are based on 5% commission plus \$200 base salary
 $0.05s + 200 = E$
 $E = \text{earnings in \$}$
 $s = \text{total sales in \$}$

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System of Equations:

Two or more equations that are being considered at the same time

Linear System:

Two or more **LINEAR** equations that are being considered at the same time

The **solution** to a linear system is an ordered pair (x, y) that "satisfies" both of the equations in the system.

Algebraically:

L.S. = R.S.
for BOTH equations

Graphically:

POI (Point of Intersection) of two lines

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Verifying a Solution to a Linear System

- ★ Separate the left side (LS) and right side (RS) of the equations.
- ★ Substitute the values for x and y from the solution into **BOTH** equations.
- ★ If the LS = RS for **BOTH** equations of your system, your solution is correct.

Example: Determine if the ordered pair (1, -3) is a solution to the linear system:

- 1) $2x - y = 5$
- 2) $-x + y = -4$

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Example: Determine if the ordered pair (1, -3) is a solution to the linear system:

$$\begin{array}{ll}
 1) & 2x - y = 5 \\
 & 2(1) - (-3) = 5 \\
 & 2 + 3 = 5 \\
 & 5 = 5 \\
 & \text{LS} = \text{RS} \\
 2) & -x + y = -4 \\
 & -(1) + (-3) = -4 \\
 & (-1) + (-3) = -4 \\
 & (-4) = (-4) \\
 & \text{LS} = \text{RS}
 \end{array}$$

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Examples:

1) Jess has \$1.55 in nickels and dimes. She has 21 coins altogether. How many of each coin does she have?

a) Define two variables that represent the unknown quantities.

Let represent

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b) Write 2 linear equations that model the situation.

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Examples:

1) Jess has \$1.55 in nickels and dimes. She has 21 coins altogether. How many of each coin does she have?

a) Define two variables that represent the unknown quantities.

Let x represent # of nickels

Let y represent # of dimes

b) Write 2 linear equations that model the situation.

$$\begin{array}{l}
 \$0.05x + \$0.10y = \$1.55 \\
 x + y = 21
 \end{array}$$

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2) Rob wants to invest his \$4,000 in summer earnings. He decides to put some in a GIC that earns 5% annually and the rest in a Canada Savings Bond that pays 4% annually. At the end of the year, he has \$180 in interest. How much did he put into each type of investment?

a) Define two variables that represent the unknown quantities.

b) Write 2 linear equations that model the situation.

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a) Define two variables that represent the unknown quantities.

x = amount in GIC
y = amount in bonds

b) Write 2 linear equations that model the situation.

$$\begin{array}{l}
 x + y = 4000 \\
 0.05x + 0.04y = 180 \text{ (interest)}
 \end{array}$$

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3) A group of grade 10 students at Notre Dame are planning a March Break ski trip to Mont Tremblant. Bus company A will charge \$1,500 to cover transportation costs and an additional \$150 per student for lift tickets and accommodations. Bus company B will charge \$2,000 to cover transportation costs and an additional \$130 per student for lift tickets and accommodations. How many students will need to go for the cost to be the same from each company?

a) Define two variables that represent the unknown quantities.

b) Write 2 linear equations that model the situation.

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Homework

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